Evacuation of blind and visually impaired Americans

An evacuation study on the ability to self-evacuate

Sørensen, Janne Gress

Published in:
Book of Abstracts

Publication date:
2014

Document Version
Publisher's PDF, also known as Version of record

Evacuation of blind and visually impaired Americans

An evacuation study on the ability to self-evacuate

Janne Gress Sørensen, PhD Student, Technical University of Denmark – Department of Civil Engineering.

During the past decades there has been an increasing focus on civil and human rights for people with disabilities [1]. The increased focus has induced changes in the way buildings are designed. Buildings need to be accessible to everyone and need to be safe as well. Since buildings has become more accessible to people with disabilities it is important that the safety design of a building follow the requirements this segment of the population have in case of an emergency and evacuation. In addition, people with disabilities are considered more vulnerable in an emergency [2].

Meanwhile design of buildings has become more complex and spectacular. These complex building is difficult to design using prescriptive building codes and performance based has been developed. Likewise performance based fire safety codes have been developed [3]. These codes allow the fire safety engineer to use engineering software tools while designing the fire safety system of a building. Regarding evacuation the software tools need input to give representative estimates. The majority of data available are based on able-bodied adults and there is a lack of data for the vulnerable segments of the population. When data on parts of building occupants a missing it is questionable if the estimates are representative for the current building.

The aim of the current study is to perform a series of evacuation experiments with blind and visually impaired Americans to gather data on their evacuation characteristics. The characteristics of interest are walking speeds horizontally and descending stairs as well as human behavior and interactions with the other evacuees and the building environment. These experiments are a supplement to a Danish study conducted in 2011. Evacuation experiments were conducted in a traditional office building in Washington DC, USA, in collaboration with National Fire Protection Association, Boston, USA. The experiments consisted of five different runs with different sizes and composition of the test groups. In total 11 participants took in the experiments. The participants were instructed in the egress path before the experiments which might have influenced the results. After the experiments the participants were interviewed about their use of the building types in general and the barriers they meet.

The analysis of the experiments and the interviews revealed the following findings:

- The free walking speed horizontally was comparable to values provided in international guidelines.
- There was detected a difference in horizontal walking speed for people with and without guide dog.
- Walking speed descending stairs was lower than for able-bodied adults and for increasing densities the majority of data points was situated below the N&M model.
- Walking speed was dependent on other participants in the flow.
- Blind and visually impaired people frequent a large variety of building types.
- The most common barrier in the building environment is illogical interior design and unpredictable layouts.

It is concluded from the study that the evacuation characteristics and behavior for people with visual impairments are different from able-bodied people. As a consequence the building designer and fire safety engineer needs to draw attention to the special requirements and needs this segment of the population have during normal use of the building as well as during emergencies.

[1] United Nations, Convention on the Rights of Persons with Disabilities and Optional Protocol, http://www.un.org/disabilities/documents/convention/convoptprot-e.pdf
[2] Marshall SW, Runyan CW, Bangdiwala SI, Linzer MA, Sacks JJ, Butts JD. Fata Residential Fires - Who Dies and Who Survives? JAMA. 1996 May: p. 1633-1637.
[3] Hadjisphocleous G.V., Bénichou N., *Development of Performance-Based Codes, Performance Criteria and Fire Safety Engineering Methods*, International Journal on Engineering Performance-Based Fire Codes, 2000,Volume 2, Number 4, p127-142